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TITLE OF THE PAPER: Determinants of the cost of capital for privately financed hospital projects in the UK

ABSTRACT

Many governments make use of private finance contracts to deliver healthcare infrastructure. Previous work has shown that the rate of return to investors in these markets often exceeds the efficient level. Our focus is on the factors that influence that return. We examine the effect of macroeconomic, project- and firm-level variables using a detailed sample of 84 UK private finance initiative (PFI) contracts signed between 1997 and 2010. Of the above variables, macroeconomic conditions and lead sponsor size are related to the investor return. However, our results show a remarkable degree of stability in the return to investors over the 14-year period. We find evidence of a ‘prevailing norm’ that is robust to project- and firm-level variation. The sustainability of excess returns over a long period is indicative of a concentrated market structure. We argue that policymakers should consider new mechanisms for increasing equity market competition, while ensuring that public authorities have the skilled human resources required to negotiate efficient contract prices

KEYWORDS: capital investment, private finance initiative, public private partnerships, hospitals, cost of capital, internal rate of return

## 1. INTRODUCTION

In many OECD countries, tight control of public sector healthcare spending has resulted in reductions to capital budgets (Morgan and Astolfi, 2014). In this context, private finance is playing an increasingly important role, especially in relation to hospitals, for which large-scale capital investments are often required. Despite a large critical literature (Dawson and Maynard, 1996; Dawson, 2001; Shaoul et al., 2008), governments in Australia, Canada, France, Italy and the United Kingdom (among others) have made extensive use of private finance contracts – variously called private finance initiatives (PFIs) or public private partnerships (PPPs) – in which a consortium of private investors undertakes to finance, build and maintain new healthcare facilities, receiving in return a periodic fee paid by the public sector. In addition, in developed countries such as Spain, and in many developing countries, this model has provided the foundation for projects in which the control of complex clinical services is transferred to the private sector for long periods (Montagu and Harding, 2012).

Between 1993 and 2010, the UK’s National Health Service (NHS) played host to the world’s largest PFI/PPP hospital-building programme (Hellowell, 2013). To date, 147 PFI projects for hospital facilities have been agreed by NHS organisations and private consortia, representing capital spending of £15.16 billion in 2013 prices (HM Treasury, 2013). This investment has been financed from two sources: *debt* (which entitles banks or bondholders

to a specified stream of cash flows in the form of capital payment and interest) and *equity* (which entitles the investor to all cash flows left in the project after meeting operational and financial costs). Our focus is on the rate of return expected by the investors of primary equity – i.e. the return on the capital invested by the original members of the consortium, which is normally constituted as a ‘special purpose vehicle’ (hereafter SPV).

Previous studies have attempted to identify the magnitude of the expected return to equity (PricewaterhouseCoopers, 2003, Vecchi et al, 2010, Hellowell and Vecchi, 2012a; Hellowell and Vecchi, 2012b, Vecchi et al., 2013). A consistent finding is that the return exceeds the cost of equity estimated using the Capital Asset Pricing Model (see box 1 for a definition) – a method commonly used by firms to determine the minimum acceptable return on investment. This implies that healthcare organisations have to pay higher fees to private consortiums than would be the case in the absence of this excess margin – a matter of clear significance in welfare terms, since the deadweight loss associated with taxation implies that the social cost of additional government spending related to positive excess returns is greater than the social benefit associated with higher producer surplus (Laffont and Tirole, 2000). Alternatively, in extra-welfarist terms, the excess return implies that healthcare systems have less capacity to address population health needs within their allocated budgets.

In this paper we focus on the difference between the expected Internal Rate of Return (IRR, see box 1 for a definition) to equity of PFI projects and the gross redemption yield on short-term government bonds (henceforth: the risk-free rate) in order to identify factors that influence the excess return on equity documented by previous studies.

By studying the difference between the IRR and the bond yield, which we call here the *Net IRR*, we are able to examine variation in the return above the risk-free rate without having to estimate for each project the appropriate risk premium, which would not be possible due to the lack of available information. We find that, of the variables that are known to impact on returns in the capital markets, only economic conditions and lead sponsor size are related to the Net IRR. Overall, we highlight the existence of a ‘prevailing norm’ in the net return that is robust to variation in firm- and project-level characteristics. The emergence of this norm, which is set at a rate shown by previous research to be in excess of that normally expected on similar assets, is indicative of a market structure that confers substantial advantages on investors – especially larger ones - when bargaining with public sector healthcare organisations.

In the context of the worldwide spread of PFI/PPP for delivering new investments in healthcare, our findings are relevant for policy makers, regulators and the managers of healthcare authorities, all of whom are interested in securing better value for money from such transactions. This is especially true in the post global financial crisis environment, in which the amount of equity, relative to debt, that is invested in PFI/PPP projects has markedly increased. Stricter capital adequacy regulations under the Basel III Accord are, for example, encouraging banks to promote more conservative (that is, less debt-heavy) capital structures for new projects. In addition, in December 2012, the UK government outlined a

set of reforms to standardised PFI contracts. These reforms – accompanied by a new policy label, Private Finance 2 (PF2) - require consortiums to increase the proportion of equity from the 5-10% of total capital expenditure that was normal under the previous PFI programme to 20-25% (Hellowell, 2013). No PF2 contract is included in the present study as no such project had been signed at the time of writing. However, as our findings relate to the return on equity, they are of crucial relevance to decision-makers in the UK and internationally, for whom the cost of this form of capital is an increasingly important issue.

## 2. THE ANALYTICAL APPROACH

Applying this kind of analysis to PFI projects is entirely new. Therefore, we utilise a set of explanatory variables that have been applied in empirical studies of private equity and venture capital returns, which are asset classes that share at least three common features with equity investments in the PFI market. First, ownership of the equity in the special purpose vehicle is held by a group (or syndicate) of investors (Gatti, 2012). Second, the equity is highly leveraged, so that debt capital finances the majority of the investment in most cases (Hellowell, 2013). Third, because of non-standard features of the asset class, liquidity is very low relative to the norm for most other parts of the capital market (Yescombe, 2007). These similarities make us confident about using the following three sets of explanatory variables.

### (i) Macro-level variables

We examine the impact of general economic conditions using two indicators. First, we use the *term spread*, i.e. the difference in interest rates on bonds with different maturities, which is known to produce accurate forecasts of recessions (Estrella and Hardouvelis, 1991). Several conceptual considerations, based on the role of monetary policy and its interplay with investor expectations, explain the use of the term spread as a leading indicator of economic activity (Estrella and Trubin 2006). A tighter monetary policy usually translates into a rise in short-term interest rates (reducing the term spread) and slows down economic activity. In turn, this may result in lower expected inflation, increasing the likelihood of a future easing in monetary policy. The expected decline in future short-term rates would tend to reduce current long-term rates, again reducing the term spread. Second, we use the *default (or credit) spread*, i.e. the difference in yields between corporate debt instruments and government securities of comparable maturity, which is used as a predictor of economic activity. Increases in the default spread can signal disruptions in the corporate credit market stemming from a deterioration in the quality of corporate balance sheets and/or from a worsening in the health of financial intermediaries that supply credit (Gertler and Lown, 1999). Fama and French (1989) argue that the term spread is closely related to short-term business cycles, while movements in the default spread are related to long-term economic conditions that span several business cycles. They also show that both spreads have predictive power for a cross-section of assets as they accurately forecast the returns for a variety of stock and bond portfolios.

The channel through which macro-level variables might influence the PFI return is different to that of other asset classes. In finance theory, a distinction is made between *systematic* and *idiosyncratic* risk (Brealey et al., 2013). The former is determined by general economic conditions and is therefore correlated between financial assets. It cannot be eliminated through portfolio diversification and investors require a premium to bear it. The latter relates to variables that are specific to the asset. This risk is eliminated through portfolio diversification and attracts no additional premium in an efficient capital market.

Returns on PFI assets are less exposed to systematic risk than in the case for most other asset classes (Vecchi and Hellowell, 2013). An SPV's costs and revenues are dictated by the terms of the contract and are largely unaffected by general economic conditions. Revenues are 'availability-based' – that is, the public authority pays a predefined fee to the private counterparty for the availability of the facility, and not the demand for it. Most costs are fixed, and those that are variable (such as those relating to the provision of long-term support services) are mostly determined by labour costs which are likely to be positively related to the level of economic activity. This indicates that the premium for systematic risk that is appropriate for the project itself should be close to zero (Vecchi and Hellowell, 2013).

However, we would still predict macroeconomic variables to have an effect, through their impact on systematic risk. This is because PFI investors typically set the target return using *corporate hurdle rates* which are based on the level of systematic risk faced by the firm across all areas of its business activities, rather than a cost of capital rate that is appropriate for the specific project under consideration (Demirag et al., 2011). The corporate hurdle rate sets a floor on the minimum return that a project must be expected to generate in order for it to receive investment from the firm. This implies that expected returns may be influenced by a firm's expectations about future economic conditions and thus the systematic risk to which its investments are subject.

#### (ii) Project-level variables

We use a series of project-level variables that have been shown to influence expected returns in private equity and venture capital markets. These variables do not relate to risk-allocation, as central government guidance requires authorities to use standard contracts and payment mechanisms within PFI contracts, implying that the magnitude and severity of risks borne by investors is similar between projects (Vecchi et al., 2013). Instead, our variables focus on investment duration, sponsor size and the degree of syndication. Hege et al. (2009) found a negative relationship between investment duration and returns in US venture capital investments, and a positive relationship between capital value and returns. Based on a sample of Canadian ventures, Brander et al. (2002) found that syndicated venture capital investments are associated with higher returns than standalone investments, suggesting that different investors – with different skills and information – run projects more efficiently when acting jointly. Cumming and Walz (2010) report similar findings for an international sample of venture capital and private equity investments. Based on these studies, it is apparent that project duration, capital values and the degree of

syndication would be expected to influence the levels of excess returns to equity investors in PFIs.

In addition, we include the time-period between the initial tender and the point at which the contract is signed as an indicator of the consortium's market power (Lonsdale, 2005; Carrillo et al., 2008; Shaoul et al., 2008; Soliño et al., 2010). The procurement process includes a final preferred bidder phase in which exclusive negotiation takes place between a single bidder and single purchaser. This market might be characterised as a bilateral monopoly (Williamson, 1979), but it is likely that the consortium is in an advantageous position vis-à-vis the public authority, knowing that it is virtually guaranteed to secure the contract at this point. Although public authorities are, in principle, able to seek out alternative suppliers if the preferred bidder proves unable to deliver an acceptable bid, avoiding failures in procurement is a high priority for the public sector which must continue to provide healthcare to the population. This may lead to an overly strong incentive to maintain negotiations with incumbent bidders rather than considering a re-run of the procurement. This might result in higher bid prices and consequently higher returns.

### (iii) Firm-level variables.

The existing literature on venture capital and buyout specialist financing highlights the positive relation between reputation and returns (Krishnan and Masulis, 2012). A strong reputation eases fundraising for new investments, gives greater influence over decisions, and generates higher returns. Earlier research has adopted a variety of proxies for reputation: Gompers (1996) and Gompers and Lerner (1998) use the age and the size of venture capital funds. Kaplan and Schoar (2005) use historical performance. Lin and Smith (1998) measure private equity group reputation by an index based on the size and the number of recent transactions. Gompers and Lerner (1998) find that older and larger venture capital funds are more likely to receive larger future returns. Kaplan and Schoar (2005) report that more reputable private equity partnerships have higher returns on their investments and that performance increases with fund size. Demiroglu and James (2010) find that buyouts sponsored by reputable funds pay lower interest rates on their debt.

In summary, plausible measures of sponsor reputation in the PFI market are: sponsor size, age, the number of projects the sponsor recently funded, and the total capital the sponsor provided in those deals. Clearly, these measures may be connected to each other: for instance, a young sponsor may be smaller, and will finance fewer and/or smaller projects. Indeed, we anticipate here that our four proxies of reputation are all positively, correlated although with different strengths (see Section 4.1). Therefore in our analysis we will include each variable separately. One complication with measuring reputation is that PFI sponsors, as noted, often invest in a syndicate with other sponsors rather than alone. When a syndicate backs a project, reputation can be calculated either as the *syndicate reputation*, i.e. the average reputation of its members, which takes into account the influences of all sponsors, or in terms of the *lead sponsor* reputation, i.e. the sponsor that has the largest capital stake at financial close, reflecting the relatively greater influence the lead sponsor

provides (Gatti et al., 2013). We therefore conduct our analysis employing proxies for lead sponsor as well as syndicate reputation.

### 3. METHODOLOGY

#### 3.1 The dataset

Our analysis is based on a sample of PFI contracts signed by NHS organisations across the UK (including England, Scotland, Wales and Northern Ireland) between 1997 and 2010. We began compiling our dataset by extracting basic project data (project name, financial close date, capital value, project length) from the HM Treasury database, which contains data on all projects signed by public authorities, 147 of which relate to the healthcare sector.

However, our analysis required further project-level and firm-level data:

1. The expected IRR on free cash-flow to equity, estimated at financial close. These data were accessed from (i) the Department of Health after requests made by the authors under the UK's Freedom of Information Act (Department of Health, 2009); and (ii) information contained in business case documentation submitted by NHS organisations to central government agencies;
2. The date of the initial tender document, taken from the *Official Journal of the European Union* (OJEU);
3. The identity and the amount of capital contribution relating to each member of the SPV at the point of financial close accessed from Partnerships UK (2010), and
4. The sponsors' industrial sector (Standard Industrial Classification code), year of incorporation, and total assets, sourced from the Bureau van Dijk's *Orbis* database.

The necessary project- and firm-level data were not available for all projects. Therefore, our sample is formed by 84 projects with a combined capital value of £12.3bn (in constant pounds at the end of 2010). Comparing it against the HM Treasury dataset, which includes 147 projects with a combined capital value of £15.16bn (in constant pounds at the end of 2010), our sample covers 57.1% and 81.1% of the original HM Treasury dataset in terms of number of projects and capital values, respectively. The smallest and largest capital values (in constant £ at the end of 2010) in the HM Treasury dataset are, respectively, £0.38m (project: Healthcare Improvement Scotland-Southern General Hospital) and £1,155.29m (project: Acute Site Rationalisation, Barts Health NHS Trust). In our sample, the smallest capital value is £12.48m (project: Bodmin Hospital), while the largest is actually the same, the PFI contract of Barts Health NHS Trust. With respect to the 63 projects we have excluded, our projects are, on average, larger (£146.31m versus £45.58m) and have longer durations (30.88 years versus 27.36 years).

It is difficult at this stage to infer how our selection may bear on the results and we can only make some conjectures. First, as noted above, our sample projects represent a substantial fraction of the entire PFI population in terms of capital value. We believe that, as far as economic relevance is concerned, what we capture in our analysis are the effects of first-order importance. Second, if there is any regularity in the practice of pricing the

financial component of PFI projects, this is likely to be set by larger, rather than by smaller, contracts. In this sense, neglecting smaller projects – as we do with our sample- should make our analysis more, and not less, informative.

## 4. RESULTS

### 4.1 Descriptive statistics

Figure 1 shows the time-series of quarterly Net IRR together with our proxies for business conditions, i.e. term spread (left panel) and default spread (right panel). This figure certifies some co-movements between returns and the term spread during the 2000s, while during the first years of our sample the Net IRR does not display the U-shape pattern followed by the term spread –most notably, from the third quarter of 1997 to the last quarter of 1998. Also, the first semester of 2005 witnessed increasing PFI profitability, coupled with a decreasing term spread. Turning to the default spread, quarterly Net IRRs match the steady decrease in the default spread during 2003, but do not appear to otherwise co-move with the default spread. We take this as suggestive that PFI returns are more related to short-term business cycles.

\*\*\*[Insert Figure 1 about here]\*\*\*

Approximately 80% of the projects in the sample (66 out of 84) were financed by a syndicate of sponsoring firms. As Table 1 shows, projects with a higher capital value and longer durations are more likely to be financed via a syndicate. Other project characteristics (Net IRR and negotiation) are not significantly different between sole-sponsor and co-sponsored projects. Overall, the projects of our sample involve a total number of 68 sponsors. UK sponsors contributed 81.8% of the total capital invested. In terms of industrial sector, ‘pure’ financial investors (that is, those without an operational interest in the project) account for the majority of capital invested (60.1%, first two-digit SIC codes 60-67), followed by construction companies and other firms belonging to the construction sector (33.2%, first two-digit SIC codes 15-17).

The top five sponsors (Balfour Beatty, Bovis Lend Lease, HSBC, Innisfree, Skanska) contributed 45% of the total capital. In assessing the structure of government procurement markets, the UK Office of Fair Trading has tended to regard market shares of >40% for the five largest firms as a “moderately high” level of market concentration, giving a “reasonable” indication of competition problems (*econ* 2004, p.179). This is of great policy significance if, as is likely, limited competition confers advantages on private sector bidders when negotiating with public authorities over contract prices, including over the price of finance.

\*\*\*[Insert Table 1 about here]\*\*\*



We now turn to analyze our proxies for sponsor reputation. For a given sponsor, these proxies depend on a project's financial close date: size is measured at the fiscal year end prior to financial close; age is the difference (in years) between the year of financial close and the sponsor's year of incorporation; and the number and value of recently sponsored projects are computed using a rolling window of three years prior to the day of financial close. It therefore follows that, for a firm sponsoring more than one project during our sample period, some reputation proxies are year-dependent (size and age) and other are day-dependent (number and value of recent transactions). In our sample, on average, each sponsor participates into 2.84 projects and four sponsors (Bank of Scotland, Barclays, Innisfree and HSBC) were involved in at least 10 initiatives. For each sponsor and each reputation measure, we average the time-varying values of reputation and report the correlation matrix among reputation proxies in Table 2. This shows that sponsor size and age are positively correlated, as well as the number and value of recent deals. The last column of Table 2 displays univariate correlation between reputation measures (at the lead sponsor level) and Net IRR: Size and age are positively (albeit not significantly) associated with PFI profitability, while recent transactions are negatively associated.

\*\*\*[Insert Table 2 about here]\*\*\*

#### 4.2 Analysis

We estimate the following model:

$$Net\ IRR_{j,t} = \alpha_i + \beta X_t + \gamma Y_{j,t} + \delta Reputation_{i,j,t} + \varepsilon_{j,t} \quad (1)$$

where  $\alpha_i$  are lead sponsor industry fixed effects (based on the first two-digit SIC codes),  $X_t$  are business conditions (the term and default spreads),  $Y_{j,t}$  are project characteristics (duration, capital value, negotiation period, and sole sponsorship indicator) and  $Reputation_{i,j,t}$  is a measure of lead sponsor reputation. Since the number and value of recent deals are based on a three-years rolling window, we include only projects closed after 2000 to estimate the model. We chose to include industry fixed effects (at the lead sponsor level) as an indicator of unobserved and time-invariant industry characteristics that could potentially affect the excess return over and above our time-varying measures of firm-level reputation.

Regression results for our model specification are reported in Table 3. Given the correlation among our reputation proxies, we include a different proxy at a time in specification (1) thereby running four different regressions (columns (1) to (4)). We find that the Net IRR is affected only by economic conditions, in that it depends positively on the term spread. Our findings are consistent with Fama and French (1989) that highlight a positive relation between expected returns on stocks and bonds and the term spread. Project-specific

variables are not related to Net IRR. With the sole exception of size, which is positively associated with Net IRR, there is no overall evidence that more reputable sponsors tend to finance more profitable investments. However, as Table 3 shows, size is significantly associated with Net IRR.

\*\*\*[Insert Table 3 about here]\*\*\*

One possible explanation for the weak explanatory power of reputation proxies is that the reputation of the syndicate of sponsors – and not that of the lead sponsor – may matter more for the return. To investigate this possibility, we estimate specification (1) dropping the lead sponsor industry fixed effects and replacing the (lead) sponsor reputation with the average reputation at the syndicate level. As before, we include a different proxy at a time in specification (1) thereby running four different regressions (columns (1) to (4)). The term spread is the only driver that is significantly associated with Net IRR, while reputation measures at the syndicate level are not significant.

We also performed a variety of robustness checks (unreported but available upon request), without altering the main conclusions that Net IRR is affected only by general business conditions and lead sponsor size. First, we recognise that the project characteristics we use as right hand-side variables can be endogenous. For instance, sole-sponsorship might be endogenous if project quality affects the probability of syndication. We have therefore estimated specification (1), dropping the project-level variables and without affecting our findings. Second, our measures of sponsor reputation based on recent transactions could reflect the evolution of the PFI programme. Indeed, the number of PFI transactions peaks during the late 90s and the years 2006-2007. We therefore constructed two additional rolling measures of sponsor reputation by scaling the number (respectively, the value) of the projects, which witnessed sponsor participation in the previous three years by the total number (respectively, the total value) of PFI projects in the previous three years. However, these two measures, like their unscaled counterparts, are not associated with Net IRR.

## 5. DISCUSSION AND CONCLUSION

Previous research has shown that the return to equity on PFI contracts normally exceeds the minimum acceptable return on investment, such that there is an element of excess return. This matters a great deal for policymakers in the health sector. If the processes through which the financing of capital investment is priced are inefficient, resources must be moved from labour to capital, and the ability of the healthcare system to meet population health need is thereby curtailed. In addition, higher finance prices mean that the amount of capital investment that can be afforded is reduced, which is likely to reduce the technical efficiency of healthcare production over time. Our results indicate that there has been a remarkable degree of stability in this excess return over the 14-year study period and that project- and

firm-level variables have no significant relationship with Net IRR. Of the variables that are known to impact on the returns that relate to comparable asset classes, only general market conditions and lead sponsor size are found to be related to the Net IRR in the PFI market. This suggests that investors set a higher corporate hurdle rate when economic conditions are expected to deteriorate, due to the increased level of systematic risk that the participating firms face. The resulting hurdle rate will normally be higher than is appropriate for specific PFI investments, which are subject to very limited systematic risk, if any.

Corporate finance theory predicts that, in an efficient market, information about the level of risk associated with an asset class will result in rapid adjustments to the risk premium required by investors and thus their expected return (Fama, 1970; 1991). In stark contrast to this prediction, our findings highlight the emergence of a 'prevailing norm' in the return to equity that is robust to both firm- and project-level variation. On average, the expected IRR on equity remains about 10% above the risk-free rate across the study period – and this is, as noted, a level that previous research has shown to be in excess of that observed on assets in the same risk class. The emergence of this norm at such a high rate suggests the existence of a market structure that confers substantial advantages on investors – especially the larger ones - when bargaining with public sector healthcare organisations. Although our findings relate to UK, a concentration in market share is likely to be a feature of privately financed infrastructure globally. Such transactions are characterised by a high degree of complexity, due to their long duration and their multi-dimensional nature. This implies that the transaction costs associated with such contracts will be high, placing a limit on the number of bidders in each procurement, and limiting the degree of competition in the market. Even in a context of adequate skills and competencies among public managers, it is clear that such concentration is likely to undermine the purchaser's ability to secure a reasonable contract price, including the price of finance.

Policymakers that wish to improve the efficiency of private finance programmes may look to encourage market entry by new investors to increase the level of competition and, in doing so, bring equity returns closer to the efficient level. As part of its Private Finance 2 reforms, for example, the UK government has, introduced an 'equity competition' during the final stages of procurement, partly to enable pension funds and other institutional investors to provide equity. If these developments allow less established investors to enter the market and increase the degree of competitive tension during the procurement phase, they may help to disrupt the pricing norms that have been created in recent years and lead to a gradual reduction in the expected return to equity investors (Hellowell, 2013). As equity is set to play a much greater role in project financing under the PF2 model (and also in comparable programmes around the world, in part due to market and state policy responses to the financial crisis), policymakers should consider mechanisms for increasing the ease of entry into the equity market as a matter of urgency.

In the interim, it is incumbent on the managers of contracting authorities to ensure they have the skilled human resources required to negotiate contract prices on the basis of returns to equity that are as close as possible to the efficient rate.

The findings are not conclusive in terms of the debate on the relative economic merits of private finance versus public finance for new hospitals. It is clear that, even where returns on equity capital (and other forms of capital) are excessive, it is possible that the PFI model generates efficiencies in project delivery that are sufficient to offset the extra cost. However, it is important that policymakers in jurisdictions in which PFI/PPP projects are, or have been, common are aware that many healthcare organisations may carry an excessive cost of capital attributable to their PFI contracts, which is likely to have an impact on their long-term financial sustainability.

There is evidence, for example, that the payments that NHS organisations in England are obliged to make under PFI deals are an important source of budgetary pressure (Pollock et al, 2011) - an important issue in a context in which one-quarter of such organisations were in financial deficit in 2013-14 (National Audit Office, 2015). In an era of unprecedented spending controls, this has the potential to compromise patient care, and it is important that healthcare organisations are properly reimbursed for their capital costs, including any excess attributable to market dynamics - over which individual contracting authorities may have little control.

Box 1: the main financial terms used in the paper

**Cost of equity:** this is the rate of return that is expected by equity providers. It is defined, according to the Capital Asset Pricing Model theory, as the sum of (i) the rate of return available on risk-free investments (the risk-free rate), and (ii) a premium for the amount of systematic risk that is involved in the equity investment (the Equity Risk Premium).

**IRR - Internal Rate of Return:** The Internal Rate of Return on a project is the rate that, when applied as a discount rate to a stream of projected cash flows, produces a Net Present Value (NPV) of zero. As an alternative, a firm may calculate the NPV with a discount rate set equal to its cost of capital. A positive NPV project increases the value of the firm. When considering an investment, a rational investor will choose those investments whose IRR is above the cost of capital for that project – i.e. the rate of return on financial assets with equivalent risk. IRR is calculated using the cash flows generated by a project. In this paper we consider a blended equity **IRR**. This IRR is calculated taking into account the cash inflows and outflows for project sponsors in their dual role of equity providers and financiers with subordinated (or junior) loans.

## REFERENCES

- Brander JA, Amit R, Antweiler W. Venture-capital syndication: Improved venture selection vs. the value-added hypothesis. *Journal of Economics and Management Strategy* 2002;**11**(3):423–452.
- Brealey R, Myers S, Allen F. Principles of Corporate Finance. New York: McGraw-Hill; 2013.
- Carrillo P, Robinson H, Foale P, Anumba C, Bouchlaghem D. Participation, barriers, and opportunities in PFI: the United Kingdom experience. *Journal of Management in Engineering* 2008;**24**(3):138-145.
- Cumming D, Walz U. Private equity returns and disclosure around the world. *Journal of International Business Studies* 2010;**41**(4):710–726.
- Dawson D. The private finance initiative: a public finance illusion? *Health Economics* 2001;**10**(6):479-486.
- Dawson D, Maynard A. Private finance for the public good? *BMJ* 1996;**313**(7053):312.
- Demirag I, Khadaroo I, Stapleton P, Stevenson C. Risks and the financing of PPP: perspectives from the financiers. *British Accounting Review* 2011;**43**(4):294–310.
- Demiroglu C, James CM. The role of private equity group reputation in LBO financing. *Journal of Financial Economics* 2010;**96**(2):306–330.
- Department of Health. 2009. Freedom of Information Response. Received by authors 06 April 2009. Department of Health reference number: DE00000396114.
- Econ. 2004. Assessing the impact of public sector procurement on competition. London: Office of Fair Trading.
- Estrella A, Hardouvelis GA. The term structure as a predictor of real economic activity. *Journal of Finance* 1991;**46**(2):555–576.
- Estrella A, Trubin MR. The yield curve as a leading indicator: some practical issues. *FRB New York Current Issues in Economics and Finance* 2006;**12**(5):1–7.
- Fama EF, French KR. Business conditions and expected returns on stocks and bonds. *Journal of Financial Economics* 1989;**25**(1):23–49.

Fama EF. Efficient capital markets: a review of theory and empirical work. *Journal of Finance* 1970;**25**(2):387–417.

Fama EF. Efficient capital markets: II. *Journal of Finance* 1991;**46**(5):1575–1617.

Gatti S. Project Finance in Theory and Practice. San Diego: Academic Press-Elsevier; 2012.

Gatti S, Kleimeier S, Megginson WL, Steffanoni A. Arranger certification in project finance. *Financial Management* 2013;**42**(1):1–40.

Gertler M, Lown CS. The information in the high-yield bond spread for the business cycle: evidence and some implications. *Oxford Review of Economic Policy* 1999;**15**(3):132–150.

Gompers PA. Grandstanding in the venture capital industry. *Journal of Financial Economics* 1996;**42**(1):133–156.

Gompers PA, Lerner J. What drives venture capital fundraising. *Brookings Papers on Economic Activity: Microeconomics* 1998:149–192.

Hege U, Palomino F, Schwienbacher A. Venture capital performance: the disparity between Europe and the United States. *Finance* 2009;**30**:7–50.

Hellowell M, Vecchi V. An evaluation of the projected returns to investors on 10 PFI projects commissioned by the National Health Service. *Financial Accountability and Management* 2012a;**28**(1):77–100.

Hellowell, M, Vecchi, V. What return for Risk? The Price of Equity Capital in Public-Private Partnerships. In Greve, C and Hodge, G (eds), *Rethinking Public-Private Partnerships: Strategies for Turbulent Times*, Abingdon, Oxon; New York, NY: Routledge, ch. 3; 2012b.

Hellowell M. PFI redux? Assessing a new model for financing hospitals. *Health Policy* 2013;**113**(1-2):77–85.

HM Treasury. 2013. *PFI projects data: March 2013*. Available at: <https://www.gov.uk/government/statistics/pfi-projects-data-march-2013> [accessed 27.10.2014].

Kaplan SN, Schoar A. Private equity performance: returns, persistence, and capital flows. *Journal of Finance* 2005;**60**(4):1791–1823.

Krishnan CNV, Masulis RW. Venture capital reputation: a survey. In: Cumming D, editor. *The Oxford handbook of venture capital*. New York: Oxford University Press; 2012, p. 61–129.

Laffont JJ, Tirole J. *Competition in Telecommunications*. Cambridge: MIT Press; 2000.

Lin TH, Smith RL. Insider reputation and selling decisions: the unwinding of venture capital investments during equity IPOs. *Journal of Corporate Finance* 1998;**4**(3):241–263.

Lonsdale C. Risk transfer and the UK Private Finance Initiative: a theoretical analysis. *Policy and Politics* 2005;**33**(2):231–49.

Montagu D, Harding A. A zebra or a painted horse? Are hospital PPPs infrastructure partnerships with stripes or a separate species? *World Hospitals and Health Services* 2012;**48**(2):15–19.

Morgan D, Astolfi R. 2014. Health spending continues to stagnate in many OECD countries. OECD Health Working Paper No. 68. Available: <http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DELSA/HEA/WD/HWP%282014%291&docLanguage=En> (accessed 11/09/2014)

National Audit Office. The financial sustainability of NHS bodies 2014. Available at: <http://www.nao.org.uk/report/financial-sustainability-nhs-bodies-2/> (Accessed 19th March 2015).

Partnerships UK, 2010. Projects Database. Partnerships UK, London (removed). <http://www.partnershipsuk.org.uk/PUK-Projects-Database.aspx>. [Accessed 01 April 2011]

Pollock A, Price D, Liebe M. Private finance initiatives during NHS austerity, *BMJ* 2011; 342 doi: <http://dx.doi.org/10.1136/bmj.d324>

PricewaterhouseCoopers. Study into Rates of Return Bid on PFI Projects. The Stationery Office: London; 2002.

Shaoul J, Stafford P, Stapleton P. The cost of using private finance to build, finance and operate hospitals. *Public Money & Management* 2008;**28**(2):101–108.

Soliño AS, Gago de Santos P. Transaction costs in transport public–private partnerships: comparing procurement procedures. *Transport Reviews* 2010;**30**(3):389–406.

Vecchi V, Hellowell M, Longo, F. Are Italian healthcare organizations paying too much for their public-private partnerships? *Public Money & Management* 2010; **30**(2):125–132.

Vecchi V, Hellowell M. Securing a better deal from investors in public infrastructure projects. Insights from capital budgeting. *Public Management Review* 2013;**15**(1):109–129.

Vecchi V, Hellowell M, Gatti S. Does the private sector receive an excessive return from investments in health care infrastructure projects? Evidence from the UK. *Health Policy* 2013;**110**(1-2):243–270.

Williamson, O. Transaction-Cost Economics: The Governance of Contractual Relations. *Journal of Law and Economics* 1979;**22**(2):233–61.

Yescombe ER. Public-private partnerships: Principles of Policy and Finance. London: Elsevier Finance; 2007.